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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

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(*See page 139*)

Vol. XVI *No. 439*

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Science More Christian Than Churches

Psychology

Advocates of the idea that war is a blessing should not be argued with but confined in a hospital for the insane, Dr. J. McKeen Cattell, pioneer American psychologist, declared in closing his address as president of the Ninth International Congress of Psychology, the first on American soil, at the gathering's first session last Monday morning.

"When in the fullness of time there is a family of the nations," said Dr. Cattell, "when each will give according to its ability and receive according to its needs. when war among them will be as absurd as it would now be for members of this congress to begin murdering one another, this will be due in no small measure to cooperation among scientific men of all nations in their common work. And it may be that psychology, the child among the sciences, and the United States, the child among the nations, shall lead them. The objects of the sciences are more ideal than the objects of the churches; their practices are more Christian."

To describe, understand and control human conduct is the object of psychology, the recent progress of which was related by Dr. Cattell. He spoke authoritatively. As the first occupant of the first chair of psychology in any American university, as the first to make psychological measurements of individual differences, the first of the now widely used mental alertness or intelligence tests, Dr. Cattell is the dean of American psychologists. Even conditioned reflexes, most often associated with the name of the great psychologist-physiologist, Prof. I. Pavlov, himself a distinguished member of the first Soviet delegation to such a congress, were first described by Dr. Cattell, formerly professor of psychology at Pennsylvania and Columbia, now editor of *Science* and president of Science Service.

Fifty years ago, in so far as psychologists are concerned, America was then like Heaven, Dr. Cattell explained, "for there was not a damned soul there." Since then this country, despite the fact that America's psychologists number less than a thousand, has developed a science, both descriptive and applied, of human nature and behavior the like of which did not issue from European psychologists. Philosophical generalizations comprised psychology before America furnished facts and methodical observations. America's psychologists have been those who ask "how and what for" rather than exclusively "why", Dr. Cattell explained.

Psychology dates back to primitive man and his speech, habits and customs. Yet psychology in its scientific phase is the baby of sciences. Dr. Cattell sees a dual reason: The complexity and instability of human behavior and the circumstance that it is easier to satisfy needs and control behavior by altering the environment than by altering individuals.

"The motions of the solar system since its beginning are less complicated than the play of a child for a day," Dr. Cattell explained.

America's progress was cited by Dr. Cattell as an example of environmental alteration: "By increasing economic production we can do more for the welfare of people than by teaching them to be virtuous and wise. In America we have constructed a great civilization, not by trying to be civilized, but by applying invention and organization to the exploitation of natural resources.

His epochal experiments on effort, fatigue, learning and variation in human performance were begun by Dr. Cattell in 1886. He has published little on his extensive researches. Today he presented a method of judging a student's progress which is much more exact than the opinion of the teacher.

If the school task is learning words of a foreign language, records are kept of the time required to learn a given number day after day. The student competes against himself, attempting to do better today than he did yesterday rather than striving to head his class.

Keeping of continuous scores and curves of games played for recreation, such as bridge, chess, billiards and tennis, was advocated by Dr. Cattell as a means of making the games interesting in themselves and thus making gambling superfluous. For the past four years Dr. Cattell has made these experiments on himself and he presented the results to the congress with the observation that in spite of the fact that millions of people daily play these four games, there has heretofore been no scientific investigation of the effects of practice or of variability in performance.

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Russian Glacier Retreating

Geology

A large glacier in the Caucasus has been found to be in retreat during recent years, thus agreeing with similar shrinkages observed elsewhere, notably in the Alps and in Alaska. This is the principal glacier of the north slope of Mt. Elborus, which forms the source of the Malka river. The expedition of the Russian State Hydrological Institute determined that this glacier has retreated 570 meters since 1889, and that during the past ten years its rate of shrinkage has been about 20 meters a year.

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Science's Mass Attack on Tuberculosis

Physiology

By Watson Davis

Hundreds of pounds of deadly microbes, carefully tended and amply fed, are now being turned over to the chemists to be torn into their constituent chemicals. The most intimate, deadly secrets of the germs are at last being revealed by orderly chemical analysis and biological experiments.

When the secret of the pestilential activity of these parasites of the cell is found out, the doctors will be in a position to devise methods of counteracting it, for they will no longer have to work in the dark as they do today. And the results so far of science's mass attack on tuberculosis, the first disease thus attacked, foretell the revolutionizing of present methods of treating and controlling disease.

Out of the chemists' test tubes into which great masses of tuberculosis bacilli had been fed there came the world's first poisonous sugar, worth hundreds of dollars an ounce, armed with the ability to cause the death of a sufferer from tuberculosis if only a small amount got into his blood.

Out of this large scale analysis of germs there also came a fatty substance which, though containing no living germs whatever, could produce the characteristic tubercles or clumps of changed cells caused by the germ of tuberculosis.

Because of these novel methods of attack upon the great white plague, there is hope that the tuberculosis bacillus may be checked in its invasion of the human race.

Dozens of chemists and medical research scientists are now engaged in medicine's greatest offensive drive against tuberculosis. Marshalled under the auspices of the National Tuberculosis Association and financed in part by the pennies that little children provide through the purchases of Christmas seals, these medical warriors are using a new method of medical warfare. They capture the germ itself and split it up into its parts and then determine which of the chemicals within the germ are guilty of producing the harmful effects.

The turning point in the Great War came when the Allied forces fighting the Germans joined in a single coordinated plan of campaign under unified control by the appointment of General Foch as commander-in-chief of all the armies. The turning point in a greater war may likewise date from the day when the allied forces fighting the germ of tuberculosis thus joined in a single coordinated plan of campaign under unified control in charge of the Research Committee of the National Tuberculosis Association. This means a revolution of the major strategy in the conquest of disease, the adoption of the policy of siege tactics and trench warfare on a larger scale instead of relying upon accidental advances and the casual attacks of individual investigators as in former times. Progress under the new plan may be slow, but it is sure, for each foot of ground gained in advances into unknown territory is securely held. A small army of experts has volunteered service in this field—chemists, bacteriologists, druggists, physiologists and physicians, more than a hundred of them, working in various parts of the country on the common problem.

EACH KIND OF BACILLUS has its own kind of sugar. In these small bottles are, from left to right, sugar from the timothy grass bacillus, from avian tuberculosis bacillus and from human tuberculosis bacillus

The first objective of the new campaign is the discovery of the cause of the disease. After that is attained the way will be opened for the discovery of a cure.

It has long been known that tuberculosis is due to certain plant-like parasites, bacilli, or in plain English, "little rods", which find a lodgment in the cells in the lungs or other parts of the body and there form nests or colonies, in the shape of little nodules, the characteristic "tubercles". But we must know more about these bacilli before we can fight them effectively. How does it happen that these little creatures have the power to pull down a strong young man? Why is it that a little local colony of these microscopic invaders can set up fevers and sweats in the entire frame and cause him to weaken and waste away? Do they poison him or what? Do the dead germs or the live ones do the damage? What are they made of? What do they give off while living? What do they leave when dead?

Obviously, the first step in the investigation was to set the chemists to analyzing the T. B. bugs. But the chemists demanded that they be supplied with the material to be analyzed by the pound, even by the hundred pounds in the long run. So two of the leading manufacturers of medicines, H. K. Mulford Company and Parke, Davis and Company, undertook to cultivate the creatures that they proposed to destroy. Fortunately, it was found that the tuberculosis bacillus, unlike many microbes, could be made to grow outside of animals and without any animal matter. They would thrive in glass flasks filled with nutrients of known composition, made up of pure chemicals. Consequently, any new substances discovered in the dead and dried germs, or in the solutions where they had lived, must be such as have been formed by the creatures themselves and such as they release inside the body. In this mass of crude material, then, we may expect to find the products that exert the deleterious effect upon the human system.

(Turn to next page)

Science's Mass Attack on Tuberculosis—*Continued*

SOME OF THE SCIENTISTS who engaged in the great drive against tuberculosis. From left to right: Dr. Esmond R. Long, University of Chicago; Dr. William Charles White, Washington, D. C.; Dr. Rudolph J. Anderson, Yale University; Dr. Florence R. Sabin, Rockefeller Institute for Medical Research, New York City; Prof. Treat B. Johnson, Yale University; and Dr. C. A. Doan, Rockefeller Institute for Medical Research, New York City

Although the chemical work may be said barely to have begun, yet it has already resulted in startling discoveries. Two, in especial, are altogether unexpected and without precedent. There has been found, among the toxic constituents of the T. B. germs, two that belong to two of our most familiar food families: an unknown fat that may form tubercles and an unknown sugar that may be fatal under certain circumstances. All the fats and sugars known hitherto are nutritious and innocuous. Not a disreputable member among the scores of fats and sugars found in nature or the hundreds that can be formed by the chemist.

But the newly found fat when injected into an animal will form the same sort of tubercles as are produced by the living germs. This fat is, of course, devoid of life; in fact, has been freed from all other substances in the complicated chemical process of purification. Probably when its structure has been worked out it will be found possible to make it artificially from mineral matter in the laboratory. It consists of an oil containing phosphorous and is a compound hitherto unknown to chemistry, although it contains the same elements as the common fats and it seems similar in constitution to the ordinary fatty acids of foods, such, for instance, as stearic acid. Yet it is capable of producing all by itself the same little nodules that are characteristic of the disease and have hitherto been found only in the colonies of the living bacilli. The first effect of the injection of this fatty fraction is to stimulate the growth of the particular kind of blood cells that the T. B. bug lives in, and the abnormal multiplication of these cells upsets the balance of the body cells. After twelve doses of this compound, each dose containing as much of the substance as is contained in a gram of the dried "bugs", the tissue shows lesions closely resembling those of the disease. If the injections are not continued the lesions become gradually absorbed and almost disappear in a few months.

Other fractions from the chemical analysis of the cultivated bacilli consist of fats and waxes that have a similar effect in stimulating and disintegrating the cells of living tissues. This action of this substance is similar to that of the unknown cause of cancer, since this likewise excites the cells to abnormal multiplication and later results in their destruction. The tuberculosis bacillus invades the living cells and there lives and multiplies. This causes the cells to enlarge to an abnormal size and shape and these clumping together form the nodules known as "tubercles". This disastrous effect is perhaps due to some substance such as these that are now being isolated, excreted by the living microbes or coming from the decomposition of their dead bodies.

The experiments showing that the characteristic tubercles could be produced by this new, germless chemical compound were performed by Dr. Florence R. Sabin and her associates, Drs. Charles A. Doan and C. E. Forkner, of the Rockefeller Institute for Medical Research in New York City. They worked with one of the fractions extracted from the tuberculosis bacilli by Prof. Treat B. Johnson and Dr. R. J. Anderson of Yale University.

The achievement of Dr. Sabin and her co-workers is revolutionary. By it the most characteristic change produced in the body by a germ-borne disease has been obtained without the germ entering the body. This is the first time this has been done for any disease and introduces a new technique into the study of disease.

The other discovery is still more unexpected. This is a strange sugar which, when injected into the blood of a tuberculous animal, will kill it quickly. Yet it is harmless to an uninfected animal. Somehow the sugar knows. It can make a diagnosis like a doctor—or better than some. Yet the sugar is a white, harmless looking powder, sort of sweetish like the other sugars, made of the same elements, so it is peculiar that it should prove to have poisonous properties. It seems to act directly on the adrenal glands, causing sweats and fevers, for the secretion of the adrenals controls the temperature reactions of the body. We may surmise in advance of evidence that the familiar symptoms of the disease and its final effects may be due, in part at least, to the constant leaking into the blood of this pernicious product from the T. B. germs as they die and decompose inside the cells of the afflicted individual and so slowly poison him.

These strange effects of this deadly sugar were discovered in tests made by Dr. William Charles White of the U. S. Hygienic Laboratory, who is also the chairman of the research committee of the National Tuberculosis Association. The sugar itself is another fraction split from the tuberculosis bacilli by Prof. Johnson and Dr. Anderson.

This is not the only case of sugar found in disease germs, for recently some unknown sugars have been extracted from pneumonia material.

The healthy person can for a time withstand the (*Turn to next page*)

Pavlov Reports New Theories on Brain

Psychology

The part of the brain lying immediately below the two cerebral hemispheres is the most important part of the nervous system in maintaining the relation of the individual to the outer world, Prof. I. P. Pavlov, famous Russian physiologist, told the International Congress of Psychology which has just closed its sessions at New Haven.

Prof. Pavlov, who is now 80 years old, is still eagerly carrying forward his quest for knowledge as to how the brain works. Describing the latest discoveries from his Leningrad laboratory, he stressed the close and strategic connection between the hemispheres of the brain which form the switchboard for the most complex conditioned, or learned, reflexes, and the sub-cortical part of the brain lying immediately beneath the hemispheres, which is the center for the most complex unlearned reflexes such as those dealing with food, sex, and self-defense.

"On the basis of the most recent experiments, I find it justifiable to separate the reflexes of these two centers from the rest of the nervous activity under the special name of the highest nervous activity," the physiologist stated.

The study of the mutual relation of these two highest parts of the brain must become one of the most important problems of the highest nervous activity, he declared.

"First of all," he explained, "the cortical conditioned reflexes are formed by means of the sub-cortical centers. A certain degree of excitability of these centers is the essential condition for the formation of the connection between cortical cells and sub-cortical centers. For instance, if an animal is already fed before an experiment, it is difficult or even impossible to form the conditioned reflexes on food."

Prof. Pavlov's experiments lead him to the conclusion that the strength and real significance of the activity of the brain hemispheres rests upon the activity of the centers just below the hemispheres. And, on the other hand, the hemispheres serve as regulators of the centers below.

The cells of the brain hemispheres are continually protected against over-stimulation, he pointed out. If a stimulus from without exceeds the maximum limit, inhibition sets in to prevent the brain cells from so intense a stimulation. The same sort of inhibition acts as a guard if the sub-cortical centers become over-excited and attempt to send in too intense messages of hunger, for instance, to the highest brain centers.

Referring to the inhibition resulting from too intense excitation in the sub-cortical center, Prof. Pavlov explained that "this fact is obviously a vital one, as it distorts the actual normal relations and furthermore gives a satisfactory explanation of hysteria."

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Science's Mass Attack on Tuberculosis—*Continued*

pernicious influences emanating from the infected area, but as these increase and his resistance weakens, he fails to react as at first and the rising and falling of his temperature becomes more extreme. We may hope that eventually the chemists will find something that will break down the waste poison of the tuberculosis bacilli into glucose or other harmless substances.

Out of these researches there may arise a new conception of life itself. It may prove that sugar is the basic life material. Heretofore fats and proteins have been considered the most characteristic substances that enter into living matter. Sugar seemed to enter into the composition of living things somewhat incidentally.

But these researches upon tuberculosis show that even the various strains of tuberculosis germs have their own, radically different sugars. The avian bacillus yields a sugar chemically and physiologically unlike that in the human or bovine sort. Recent research upon the sugars contained in the germs causing pneumonia, the pneumococci, shows that each germ of this group has its own sort of sweet.

So there is beginning to be built a new theory of the chemical nature of life, founded on sugar specificity. Even the green leaf of the growing plant in which the sunlight builds carbohydrates may have its secrets unlocked by a continuation of the investigations that the tuberculosis work has pioneered.

It is already obvious that the new tactics for the investigation of disease, while at first focussed upon the tuberculosis problem, will throw light upon other diseases and, in fact, upon the fundamental processes of human physiology. For the three grand classes of components found in these laboratory-raised bacteria, that is, fats, sugars and proteins, are the same as constitute our bodies and our food. But how these three kinds of compounds combine in the body is still a mystery. The chemist has isolated and determined the composition and construction of all the common fats, sugars and proteins. Some of them he even can make synthetically in his laboratory. He can figure out closely just how much of these various ingredients of the food are needed for a particular day's work. He can tell, for instance, just how many more foot-pounds a man can lift by adding an ounce of glucose to his ration. The chemist can trace the molecules of glucose through the blood stream till it gets to the muscle where it is needed. But there he loses track of it. He is still much in the dark as to how the protein in the muscle fiber seizes on to the sugar and gets energy out of it and what part is played by the phosphorized fatty acids present. If he can find out how these three substances are hitched up in normal life, he would most likely be able to find out how they hitched up wrongly in disease and finally how to correct the blunder.

Two major outposts have been taken, but the battle has not yet been won. Among the scientific organizations joining with the National Tuberculosis Association in the attack are: U. S. Public Health Service; U. S. Bureau of Animal Industry; National Research Council; American Sanitorium Association; Henry Phipps Institute, Philadelphia; Edward L. Trudeau Foundation, Saranac Lake; Rockefeller Institute for Medical Research, New York; University of California; University of Cincinnati; University of Chicago; Cornell University Medical School; the Johns Hopkins University; University of Nebraska; University of Pennsylvania; Vanderbilt University; University of Wisconsin; Yale University; H. K. Mulford Company; Parke, Davis and Company.

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Animal Psychology

Watching baby kittens in order to learn how they come to join in the cat's age-old warfare on the rat tribe is one of the latest tasks that psychologists have set themselves. Five kittens from birth to five months of age have been closely observed by Dr. W. W. Rogers, of New York University, who presented a theory on the subject before psychologists assembled at the International Congress of Psychology in New Haven.

Young white rats and wild gray mice were placed in the cages with the kittens, sometimes for as long as ten hours at a time.

"During the five months only one kitten killed and ate a white rat that was more than eight days old," Dr. Rogers said. "In this case when a white rat with a bloody ear was placed in the cage with the kitten it was killed and eaten after considerable manipulation. The same kitten, however, never killed or ate a white rat again."

Three kittens learned to kill and eat wild gray mice and three kittens learned to kill and eat baby white rats, after the kittens were five months of age. One kitten never learned the cat's favorite sport during the entire period of observation.

The psychologist's theory is that the moving rat attracts the interest of the kitten, and this soon develops into an impulse to manipulate and then to chase rats. If the kitten seizes a rat and the rat struggles, the kitten bites harder and breaks the skin and so tastes rat blood. Thus, the kitten learns to kill and eat rats as a matter of course after it learns to associate the moving rat with food.

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Why Children Jeer at Strangers

Psychology

How the school boy learns to jibe at "wops," "frogs," "Chinks," "coons," "Heinies," and other nicknamed types has been probed by an educator in Wales. Dr. George H. Green, of University College of Wales, speaking before the International Congress of Psychology, said that he found indisputable evidence that Welsh children do display racial prejudices.

Books are of greater importance in forming the opinions of children regarding alien races than either school or religious instruction, he found. The roles played by the negro and Chinese in moving picture dramas has strongly influenced childish opinion regarding these races. But the movies do not seem to have affected the attitude of Welsh children toward Americans.

Facts collected regarding the influence of books, movies, newspapers, religious institutions and other agencies that shape children's opinions toward the races of the world can be used to make these agencies more effective in a constructive way, the educator pointed out.

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What Boys Like at Church

Psychology

The wriggling youngster who gets nothing out of attendance at a dull church service has at last gained the sympathetic attention of science. An attempt to find out how to make church services effective for boys has been started by Prof. Goodwin Watson, of Teachers' College, Columbia University and his investigation was described before the International Congress of Psychology at New Haven.

Following the experimental method, Prof. Watson prepared seven services of worship each containing some distinctive feature, such as an organ selection, a story, a long heroic poem. One service included a talk stressing the intellectual and scientific interpretation of the universe.

Five hundred boys from fourteen to twenty years of age were then called upon to attend the services. At the close of each service, the boys filled in rating cards, showing seven degrees of interest and approval. The possible verdicts ranged from intense experience of worship to the low point of boredom and wishing they were somewhere else.

Judging from the facts so far gathered, boys prefer emotional appeal to intellectual appeal in church. They like to be familiar with the procedure and they do not care for a great deal of reading or printed matter. Further experiments will be conducted, Prof. Watson said.

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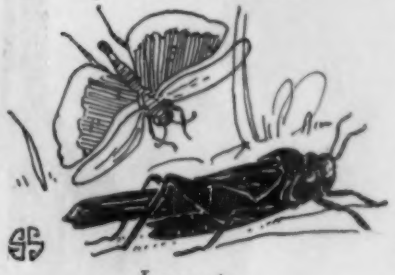
Nature Ramblings

Natural History

By Frank Thone



Locusts

The days are shortening now, and the noon heats are not so ardent as they were a month ago; yet the grasshopper sings as though he had never heard of Aesop and his industrious but offensively priggish ant. So long as there is an hour of bright sunshine, and no numbing frost at night, Tettix will tune his shrill lyre regardless of the future. He eats and is merry, for tomorrow he is sure to die anyway.

It is a pity that in this country the title "locust" should have been taken from the winged grasshopper and given to the cicada. It makes for all sorts of confusion, both in nature study proper and in folklore, the elder but irresponsible sister of that amiable science. The real locusts are grasshoppers, and by proper definition one group of long-winged grasshoppers only. The devastation credited to locusts in Genesis and elsewhere in ancient literature could never have been done by cicadas, which do not have chewing mouthparts. But it could be done, and was done, by hordes of flying grasshoppers. Ask any inhabitant of Kansas about grasshopper years, and you will learn what Pharaoh saw from the banks of ancient Nile.

We hear less of grasshopper years nowadays, though the locust pests do make themselves troublesome at times. Their abatement must be credited largely to the destruction of their breeding grounds by the plow. When Kansas suffered under the scourge of locusts back in the old days, the western part of the state and eastern Colorado were still largely unplowed. Grasshoppers lay their eggs in the ground, but the plow, making the land ready for winter wheat, overturns the shallow burrows and lays the eggs open to drought and cold. Hence the more complete the cultivation the scarcer become the locusts.

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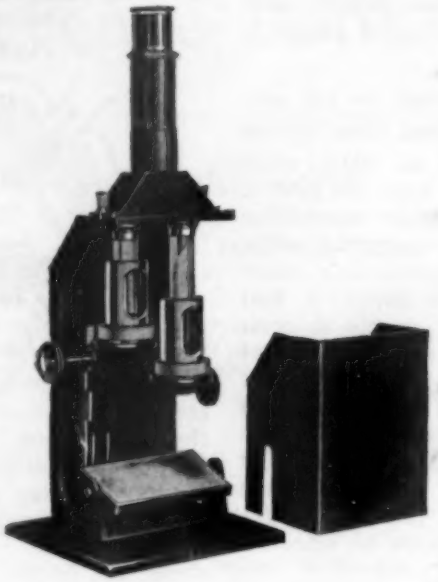

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CLASSICS OF SCIENCE:

Mastodons in North America

Paleontology

The age of rock formations and the dating of fossils, especially of the large extinct quadrupeds, were matters of lively controversy when Lyell, almost a generation before "The Origin of Species" was published, made his important trip to North America, making notes as he went of the geology, flora, fauna, customs of the inhabitants, and everything else of interest that came his way. (For his description of Niagara Falls, see the SCIENCE NEWS-LETTER, July 13, 1929.)

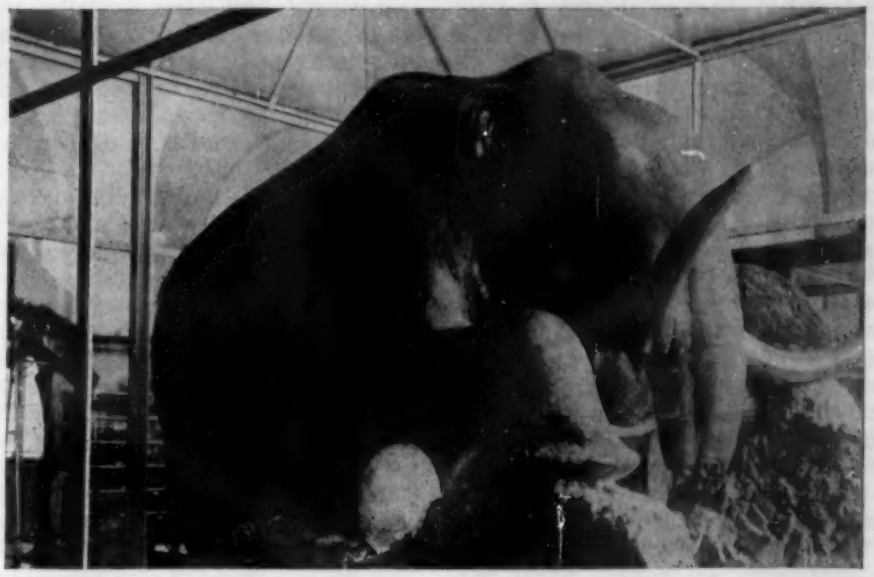
TRAVELS IN NORTH AMERICA; with Geological Observations on the United States, Canada, and Nova Scotia. By Charles Lyell. In two volumes. London: 1845.

Terraces at Cincinnati

The Ohio river at Cincinnati, and immediately above and below it, is bounded on its right bank by two terraces, on which the city is built; the streets in the upper and lower part of it standing on different levels. These terraces are composed of sand, gravel, and loam, such as the river, if blocked up by some barrier, might now be supposed to sweep down in its current, and deposit in a lake. The upper terrace, is bounded by steep hills of ancient fossiliferous rocks, the blue, Lower Silurian limestone, mentioned in the last chapter, in horizontal stratification. The higher terrace is about 60 feet above the lower, and this again about 60 feet above low water in the Ohio. The geologists here are convinced that the inferior terrace is of newer origin as shown in the section and proved by excavations, not exposed at the time of my visit.

In sinking a well at the distance of 300 yards from the Ohio, and at the depth of 50 feet from the surface, they found pieces of wood and many walnuts in a bed of silt.

Near the edge of the higher terrace, in digging a gravel-pit, which I saw open at the end of Sixth street, they discovered lately the teeth of the *Elephas primigenius,* the same extinct species which is met with in very analogous situations on the banks of the Thames, and the same which was found preserved entire with its flesh in the ice of Siberia. Above the stratum from which the tooth was obtained, I observed about six feet of gravel covered by ten feet of fine yellow loam, and below it were alternations of gravel, loam, and sand, for 20 feet. But I searched in vain for any accompanying fossil shells. These, however, have been found in a similar situation at Mill Creek, near Cincinnati; a place where several teeth of mastodons have been met with. They belong to the genera



A STUFFED MAMMOTH is a unique exhibit of which the Leningrad museum can boast. This famous animal was found frozen in the perpetual ice in Siberia, its hide still fit for the purposes of taxidermy and its flesh still edible

Melania, Lymnæa, Amnicola, Succinea, Physa, Planorbis, Paludina, Cyclas, Helix, and *Pupa,* all of recent species, and nearly all known to inhabit the immediate neighborhood. I was also informed that, near Wheeling, a bed of freshwater shells, one foot thick, of the genus *Unio,* is exposed at the height of 120 feet above the mean level of the Ohio. The remains of the common American mastodon (*M. giganteus*) have also been found at several points in the strata in the upper terrace, both above and below Cincinnati.

Upon the whole it appears, that the strata of loam, clay, and gravel forming the elevated terraces on both sides of the Ohio and its tributaries, and which we know to have remained unaltered from the era of the Indian mounds and earthworks, originated subsequently to the period of the existing mollusca, but when several quadrupeds now extinct inhabited this continent. The lower parts both of the larger and smaller valleys appear to have been filled up with a fluviatile deposit, through which the streams have subsequently cut broad and deep channels. These phenomena very closely resemble those presented by the *loess,* or ancient river-silt of the Rhine and its tributaries, and the theory which I formerly suggested to account for the position of the Rhenish loess (also charged with recent land and freshwater shells, and occasionally with the remains of the extinct elephant) may be applied to the American deposits.

I imagine first a gradual movement of depression, like that now in progress on the west coast of Greenland, to lessen the fall of the waters, or the height of the land relatively to the ocean. In consequence of the land being thus lowered, the bottoms of the main and lateral valleys become filled up with fluviatile sediment, containing terrestrial and freshwater shells, in the same manner as deltas are formed where rivers meet the sea, the salt-water being excluded, in spite of continued subsidence, by the accumulation of alluvial matter, brought down incessantly from the land above. Afterwards, I suppose an upward movement gradually to restore the country to its former level, and, during this upheaval, the rivers remove a large part of the accumulated mud, sand, and gravel. I have already shown that on the coast of Georgia and South Carolina in the United States, we have positive proofs of modern oscillations of level, similar to those here assumed.

Big Bone Lick

Two days after I reached Cincinnati, I set out, in company with two naturalists of that city, Mr. Buchanan and Mr. J. G. Anthony, who kindly offered to (*Turn to next page*)

Mastodons in North America—*Continued*

be my guides, in an excursion to a place of great geological celebrity in the neighbouring state of Kentucky, called Big Bone Lick, where the bones of mastodons and many other extinct quadrupeds had been dug up in extraordinary abundance. Having crossed the river from Cincinnati, we passed through a forest far more magnificent for the size and variety of its trees than any we had before seen. The tulip-tree (*Liliodendron tulipferum*), the buckeye, a kind of horse-chestnut, the shagbark hickory, the beech, the oak, the elm, the chestnut, the locust-tree, the sugar-maple, and the willow, were in perfection, but no coniferous trees,—none of the long-leaved pines of the Southern Atlantic border, nor the cypress, cedar, and hemlock of other States. These forests, where there is no undergrowth, are called "wood pastures." Originally the cane covered the ground, but when it was eaten down by the cattle, no new crop could get up, and it was replaced by grass alone.

Big Bone Lick is distant from Cincinnati about twenty-three miles in a S. W. direction. The intervening country is composed of the blue argillaceous limestone and marl before mentioned, the beds of which are nearly horizontal, and form flat table-lands intersected by valleys of moderate depth. In one of these, watered by the Big Bone Creek, occur the boggy grounds and springs called Licks. The term Lick is applied throughout North America to those marshy swamps where saline springs break out, and which are frequented by deer, buffalo, and other wild animals for the sake of the salt, whether dissolved in the water, or thrown down by evaporation in in the summer season, so as to encrust the surface of the marsh. Cattle and wild beasts devour this incrustation greedily, and burrow into the clay impregnated with salt, in order to lick the mud. Bartram, the botanist, tells us, that in his time (1790) he visited Buffalo Lick in Georgia, forming part of a cane swamp, in which the head branches of the Ogeechee river take their rise. The lick consisted of "white-coloured tenacious fattish clay, which all kinds of cattle lick into great hollows, pursuing the delicious vein." "I could discover nothing saline in its taste, but an insipid sweetness. Horned cattle, horses, and deer are immoderately fond of it, insomuch that their excrement, which almost totally covers the earth to some distance round this place, appears to be perfect clay, which, when dried by the sun and air, is almost as hard as brick." (Travels in N. and S. Carolina, &c. p. 39.)

The celebrated bog of Kentucky is situated in a nearly level plain, in a valley bounded by gentle slopes, which lead up to the table-lands before mentioned. The general course of the meandering stream which flows through the plain, is from east to west. There are two springs on the southern or left bank, rising from marshes, and two on the opposite bank, the most western of which, called the Gum Lick, is at the point where a small tributary joins the principal stream. The quaking bogs on this side are now more than fifteen acres in extent, but all the marshes were formerly larger before the surrounding forest was partially cleared away. The removal of tall trees has allowed the sun's rays to penetrate freely to the soil, and dry up part of the morass.

Within the memory of persons now living, the wild bisons or buffaloes crowded to these springs, but they have retreated for many years, and are now as unknown to the inhabitants as the mastodon itself. Mr. Phinnel, the proprietor of the land, called our attention to two buffalo paths or trails still extant in the woods here, both leading directly to the springs. One of these in particular, which first strikes off in a northerly direction from the Gum Lick, is afterwards traced eastward through the forest for several miles. It was three or four yards wide, only partially overgrown with grass, and, sixty years ago, was as bare, hard, and well trodden as a high road.

The bog in the spots where the salt springs rise is so soft, that a man may force a pole down into it many yards perpendicularly. It may readily be supposed, therefore, that horses, cows, and other quadrupeds, are now occasionally lost here; and that a much greater number of wild animals were mired formerly. It is well known that, during great droughts in the Pampas of South America, the horses, cattle, and deer throng to the rivers in such numbers, that the foremost of the crowd are pushed into the stream by the pressure of others behind, and are sometimes carried away by thousands and drowned. In their eagerness to drink the saline waters and lick the salt, the heavy mastodons and elephants seem in like manner to have pressed upon each other, and sunk in these soft quagmires of Kentucky.

The greater proportion both of the entire skeletons of extinct animals, and the separate bones, have been taken up from black mud, about twelve feet below the level of the creek. It is supposed that the bones of mastodons found here could not have belonged to less than one hundred distinct individuals, those of the fossil elephant (*E. primigenius*), to twenty, besides which, a few bones of a stag, horse, megalonyx, and bison, are stated to have been obtained. Whether the common bison, the remains of which I saw in great numbers in a superficial stratum recently cut open in the river's bank, has ever been seen in such a situation as to prove it to have been contemporaneous with the extinct mastodon, I was unable to ascertain. In regard to the horse, it may probably have differed from our *Equus caballus* as much as the zebra or wild ass, in the same manner as that found at Newberne in North Carolina appears to have done. The greatest depth of the black mud has not been ascertained; it is composed chiefly of clay, with a mixture of calcareous matter and sand, and contains 5 parts in 100 of sulphate of lime, with some animal matter. Layers of gravel occur in the midst of it at various depths. In some places it rests upon the blue limestone. The only teeth which I myself procured from collectors on the spot, besides those of the buffalo, were recognized by Mr. Owen as belonging to extremely young mastodons. From the place where they were found, and the rolled state of some of the accompanying bones, I suspect that they had been washed out of the soil of the bogs above by the river, which often changes its course after floods.

Mr. Cooper of New York, who has given the fullest account of the fossils of this place, says, that the remains of reeds and freshwater mollusca accompany the bones; but he names no species of shells. Mr. Anthony and I were therefore diligent in our search for shells in pits which happened to have been recently laid open by col- (*Turn to next page*)

Negro Children Vary

Psychology

Negro children who live in different sections of America vary markedly in mental ability, judging by results of psychological tests which have been given to children in Nashville, Chicago, and New York City. Two hundred white children and three hundred negro children, all twelve years of age, have been examined by Prof. Lyle H. Lanier, of Vanderbilt University, who described the investigation before the International Congress of Psychology.

The children were asked to learn to associate certain numbers with certain letters of the alphabet. In Nashville, the white children excelled the negroes in time required to learn the series, in the errors made, and in the speed of responding. The negroes were practically equal to the whites in the number of repetitions required. In Chicago smaller differences were found, though the white children made a better rating on the test. In New York the negro children were superior in the number of repetitions required and in the total number of errors made, and in the number of logical errors made. The white children excelled in speed and in the number of repeated errors, and they were markedly faster in responding, Prof. Lanier stated.

Science News-Letter, September 7, 1929

Brown Spider is Sleepers' Friend

Entomology

Bedbugs, which have given tourists many a bad night in Athens and which added to the discomforts of the already wretched refugees in Greek camps during the troubles with Turkey a few years ago, have met their Nemesis in a spider. So reports Dr. N. T. Lorando, chief physician to the Evangelismos Hospital and Near East Relief, Athens.

During 1923 and 1924, Dr. Lorando says, conditions in the large refugee camp near Athens were deplorable. In spite of the efforts of the people to keep the premises cleaned and disinfected the bloodsucking insects bred in hordes, sometimes driving them out of the barracks to sleep in the streets. Then, suddenly, the bedbugs disappeared altogether.

At first it was thought that the disinfectants had at last prevailed, but on investigation it was discovered that a medium-sized brown spider was the real benefactor. This eight-legged friend of man would walk up to an unsuspecting bedbug, bite it through the back, and drain it of its blood. It also seemed to have the power of making the insects suspend movement by touching them with one leg, if it saw a fresh victim while it was still busy with a recent catch. Its appetite was large, laboratory specimens devouring thirty or forty bedbugs a day.

Each female spider laid two or three batches of eggs during a summer, standing guard over the nest until the young spiderlings hatched. These were precocious hunters, starting off on the business of bedbug eradication the day they first saw the light, in spite of the fact that they were then much smaller than their prey.

The generic name of this spider is suggestive: *Thanatos,* which is the Greek word meaning death. The spider is death only to vermin, however, for it is not poisonous to human beings. Another species of the same genus has been observed hunting horseflies in Sicily, which may account for the Sicilian folk-belief that horses can not be healthy unless there are cobwebs in the stable.

Dr. Lorando cites several other instances on record, where bedbugs have found enemies in the ranks of their own insect kin. Among these are the assassin bugs, better known a generation ago as "kissing bugs," and also cockroaches and the tiny red house-ants. But all of these are themselves rated as vermin, so that the remedy is almost as bad as the ill. Dr. Lorando recommends the artificial encouragement of his spider, because *Thanatos* is not herself offensive and because she has made a very good record as a pest-destroyer.

Science News-Letter, September 7, 1929

Mastodons in North America—*Continued*

lectors of fossil bones; and we soon obtained a small *Ancylus* and *Cylas.* Afterwards, in the most eastern marsh, in the middle of which a powerful spring throws up beech nuts and shells from the mud below, we found two species of *Melania* known as recent, *Physa heterostropha, Cyclas similis, C. dubia?* (and another species, not known to naturalists here,) *Pisidium* (supposed to agree with one from Lake Erie), *Ancylus* (not known), and fragments of *Unio;* also the following land shells—*Helix solitaria* (with bands of colour not effaced). *H. alternata, H. clausa, H. fraterna,* and *Pupa armifera.* As new terrestrial and freshwater shells are occasionally added to the recent American fauna, I think it very probable that all the fourteen species which we met with, and which, I believe, co-existed with the mastodon, are still living, though perhaps not all of them in the immediate neighbourhood.

The Ohio River

It is impossible to view this plain, without at once concluding that it has remained unchanged in all its principal features from the period when the extinct quadrupeds inhabited the banks of the Ohio and its tributaries. But one phenomenon perplexed us much, and for a time seemed quite unintelligible. On parts of the boggy grounds, a superficial covering of yellow loam was incumbent on the dark-coloured mud, containing the fossil bones. This partial covering of yellow sandy clay, was at some points no less than fifteen or twenty feet thick. Mr. Bullock passed through it when he dug for fossil remains on the left bank of the creek, and he came down to the boggy ground with bones below. We first resorted to the hypothesis that the valley might have been dammed up by a temporary barrier, and converted into a lake; but we afterwards learnt, that although the Ohio is seven miles distant by the windings of the creek, there being a slight descent the whole way, yet that great river has been known to rise so high as to flow up the valley of Big Bone Creek, and, so late as 1824, to enter the second story of a house built near the springs. The level of the Licks above the Ohio, is about fifty feet, the distance in a straight line being only three miles. At Cincinnati the river has been known to rise sixty feet above its summer level, and in the course of ages it may occasionally have risen higher. It may be unnecessary, therefore, to refer to the general subsidence before alluded to (probably an event of a much older date), in order to account for the patches of superficial silt last described.

After spending the day in exploring the Licks, we were hospitably received at the house of a Kentucky proprietor a few miles distant, whose zeal for farming and introducing cattle of the "true Durham breed," had not prevented him from cultivating a beautiful flower-garden.

Science News-Letter, September 7, 1929

A Free Biology Manual for High School Teachers

Our new catalog, which is now ready for mailing, is a combined teachers' manual and catalog of biological supplies for high school use. We have made every effort to make this 192-page book of real value to the high school teacher. It contains a Botany and Zoology Manual, a detailed article on the school aquarium, a large number of original illustrations and many short biological notes. The illustrations include over fifty original drawings, a large number of which are carefully labeled, diagrams of dissections and identification plates of laboratory plants and animals.

The Botany and Zoology Manuals, which occupy about sixty pages, are written especially for the high school teacher. In these manuals, we have made no attempt to present detailed courses of study, as such material is readily available in the many students' laboratory manuals now on the market. Instead, we have tried to include information which will be of value to the teachers in planning and carrying through a worth-while course in beginning biology. The desirability of studying living material is emphasized and we have made many suggestions as to ways in which teachers can collect and prepare much of their own laboratory material.

In the Zoology Section of the manual, the following type forms are discussed in detail, under such headings as collection, care of specimens in the laboratory, study of living specimens, etc.: Protozoa, Grantia, Hydra, Earthworm, Crayfish, Grasshopper, Honey-bee and Frog. The Botany Section of the teachers' manual considers in a similar way, Gleocapsa, Nostoc, Vaucheria, Spirogyra, Rhizopus (Mucor), Lichens, Mosses, Marchantia, Fern and Pine, as well as general discussions of the main groups—Algae, Fungi, Gymnosperms, Angiosperms, etc. An abundance of carefully labeled illustrative matter supplements the text.

Some of the practical suggestions will, we believe, be of value and interest to even the more experienced teachers. The following subjects are just a few of those which are discussed and explained in the manual:

Demonstrating how Hydra feed.
Finding living Vaucheria during the winter months.
Collecting mosses at the proper seasons.
Growing protozoan cultures.
Suitable material for a study of the angiosperms.
Studying living frog eggs.
Collecting insects.
Aquarium methods.
Living earthworms in the laboratory.
Regeneration experiments with Planaria.

The catalog section lists a very complete line of material for high school biology work. The items which have been included are those which are particularly useful in beginning biology courses. Many of the preparations have been specially developed to meet the need and requirements of high school teachers. In this section of the catalog are described—preserved and living specimens, microscope and lantern slides, demonstration preparations, life histories, models, charts, apparatus and instruments—everything, in fact, that is needed in the high school course.

This combined High School Biology Catalog and Teachers' Manual will prove of interest to every science teacher. We have already mailed copies to all teachers whose names are upon our mailing list. Addresses change, however, and if you have failed to receive your copy, please ask for it. One of these books will be sent to you at once and, we believe, that you will find it helpful and interesting.

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MARGARET EMERSON BAILEY, in *Harper's Magazine*

Not in slight nor in derision,
But with pencil-point precision,
He who made Pythagoras
Made the snake that parts the grass;
Made the texture of its skin
Parchment to work problems in.
He who drew an adder's spread
To a rhomboid at its head,
Let no ferrule falter loose
On the straight hypotenuse
Obliquely slanting the dull eye
Of the snake that rustles by.
Not the rod of Roman lictor
Could lay lashes any stricter
Than the stripes, exact and neat,
Parallels that will not meet,
Running straight from tip to tail
On a buckling coat of mail
Fashioned out of lozenges.
And as intricate as these—
Pointed triangle and square,
All the rigid shapes that are,
Octagon and pentagon,
He has deftly patterned on
Some unscrolled and rippling back
As a method of attack
Till every scale and single joint
Proves some problematic point,
Working out with subtlety
A divine Geometry.

Science News-Letter, September 7, 1929

Fear of Unknown Analyzed

Psychology

Fear of the unknown plays a major role in the drama of every human life, a German psychologist, Dr. L. Seif of Munich, told the International Congress of Psychology at New Haven, last Thursday.

When a child begins to ask "why" at four years of age he is already trying to overcome the feeling of uncertainty and anxiety that human beings naturally hold toward what is strange, Dr. Seif showed. Strange experiences and objects are new, uncertain, dangerous, and such things are faced throughout life with anxiety. What is known, on the other hand, is safe and inspires confidence.

"If a child receives from his educators the right preparation—love, confidence, encouragement, and suitable training for overcoming the difficulties of the strange—he then learns always better to transform the strange into the known," the speaker explained.

If a child is spoiled, he does not learn to deal courageously with the strange. His experiences are characterized by disappointment, anxiety, and withdrawal.

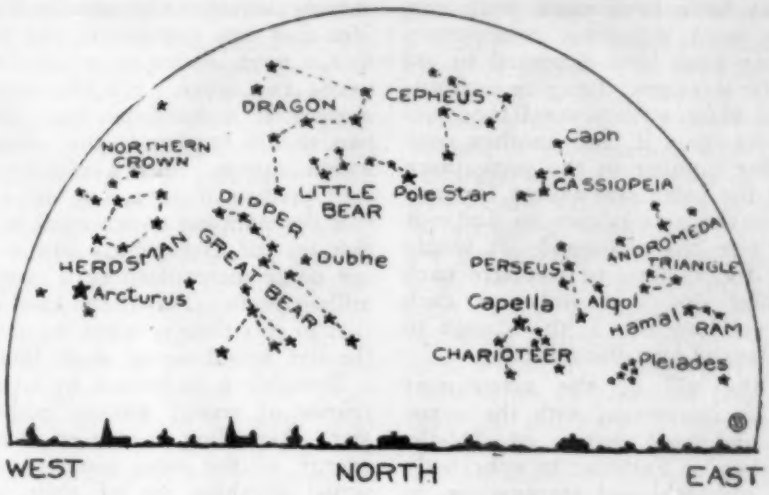
Science News-Letter, September 7, 1929

Heavenly Swan Now in Evening Sky

Astronomy

By James Stokley

With September comes the beginning of autumn. The birds that migrated to the north during the summer months have now begun to think about their long southward trip. Toward the end of the month, in parts of the country, they will be seen flying over head. Among the other birds that will be seen are the swans, with long necks stretching out ahead in a southerly direction, so it is quite appropriate that the heavenly swan should be visible in the sky at this time of the year. Look overhead tonight, and you will see a cross-shaped group of stars. This is Cygnus, the swan. Unlike many of the constellations, it is a group that does bear some faint resemblance to the object which it represents.



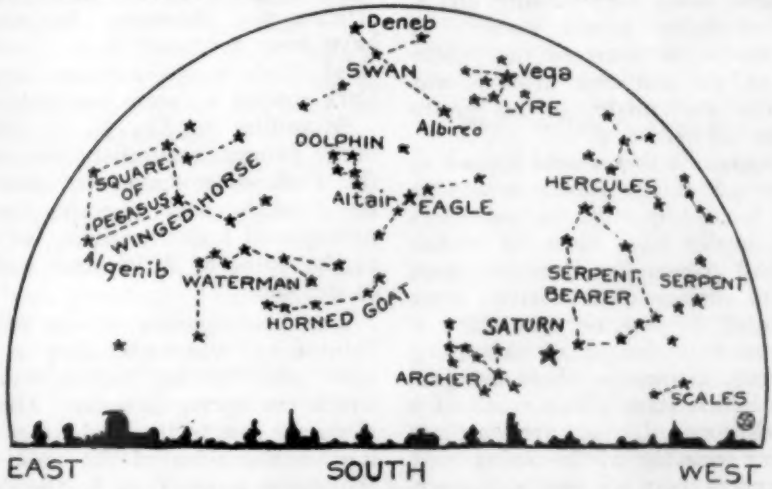
On the old star maps, such as the one by Bayer, published in 1603, the swan was depicted as flying toward the south. The lower part of the cross, the longer part, represents its neck. The cross pieces are the wings and the short upper part is the tail. There are five bright stars in Cygnus, forming the outlines of the cross. The brightest of these, the northernmost one and marking the swan's tail, is Deneb. In Cygnus there are many faint stars, the more so because it is right in the heart of the Milky Way. In it also is one of the stars which once had ideas of grandeur, and became a "nova" or new star.

Before 1920 there was a star in Cygnus of the fifteenth magnitude, much too faint to be seen except with the very largest telescopes. Nobody had paid any particular attention to it, there seemed to be nothing about it to distinguish it from the ordinary run of stars. But one day in 1920, an English amateur astronomer, by the name of Denning, happened to look up at Cygnus and was surprised to find a star there that he had never seen before. It was of about the second magnitude. He looked at his map in surprise, to make sure that he had not suddenly forgotten some well known star. Then he realized that he had become the fortunate discoverer of a nova. The astronomical world was immediately notified, and telescopes were trained on it. Within a few days its magnitude increased to about 1.8, nearly as bright as Deneb itself. Then it began to diminish and now it is so faint that a large telescope is required to see it.

This was not the first nova to appear in Cygnus. Back in 1600 one appeared there, while another came along in the year of the American Centennial, 1876. Nor are these the only novae that have appeared. Since 1900 there have been five that have become conspicuous to the naked eye. In 1901 a very brilliant one appeared in Perseus, another flashed out in the Twins in 1912, one appeared in the Eagle, which is seen to the southwest of Deneb, in 1918. The nova in Cygnus appeared in 1920, and in 1925 a remarkable one appeared in Pictor, a constellation that is not visible from northern latitudes.

There is no particular reason to think that the first quarter of our century has been especially favored with these astronomical fireworks. Probably a great many more have appeared, but so far away that, even at maximum brilliance, they have been too faint to be detected from the earth. In fact, in the huge collection of photographic plates, made at the Harvard College Observatory, many such new stars have been found that were never noticed at the time they flashed out. The photograph tells the story.

A plate made one year may show a swarm of small black dots, each of which represents a star. Another plate made a few years later shows the same swarm of stars, but one of the black dots is a little larger than it was in the first. Still later plates might show it small again. The astronomer, examining these, sees that the star brightened up only once, and so knows that it is probably not a variable star, of the kind that regularly wax and wane. Thus he knows that he has found a nova even though it may be twenty or thirty years after the photograph was taken. (*Turn to next page*)



HOLD THESE MAPS in front of you and face North or South. The upper or lower one will then show the stars of the September evening sky

Heavenly Swan Now in Evening Sky—*Continued*

Incidentally, many of these discoveries have been made with one of the most ingenious instruments that has even been invented to aid scientific workers. Imagine a photographic plate with several thousand tiny dots upon it, and another with a similar number in the same place and of the same size except for one. How is the astronomer to find out which one has changed? It would be far too tedious to compare each particular dot separately on each plate, yet how else is the change to be measured and discovered?

To the aid of the astronomer comes an instrument with the somewhat awkward name of "blink-mikroskop". Familiar to everybody is the old-fashioned stereoscope, in which a pair of photographs is used, one for each eye. In the blink-mikroskop, the two photographic plates are placed side by side. Light passes through them to a system of lenses and the astronomer looks at them through an eye-piece similar to that of any ordinary microscope. But prisms bend the path of light so that in the same eye piece the astronomer can see either one of the plates. A small lever operates a shutter that changes from one to the other.

Thus, if you have two plates of stars, and want to find out which one has changed, all you have to do is to put them in a blink-mikroskop. Then you adjust them until the stars in each are in the same relative place. This assumes, of course, that both photographs were made with the same camera, so that the stars on the plate are the same distance apart. Then you operate the lever, or "blink" the plates, as the astronomer would say. The stars that have not changed look the same in one as in the other, so if both are entirely identical, the motion of the lever will not produce any noticeable effect. But if one of the stars has changed, that is, if in one plate it is small and in the other it is large, then the shift of the blink lever will cause this one to apparently swell and contract in a most peculiar fashion. This causes it to stand out at once from the background, and so a change may be very quickly detected.

What causes a star, ordinarily well behaved, to suddenly have delusions of grandeur and become thousands of times as bright as it used to be?

This is one of the outstanding astronomical questions, and has never been entirely satisfactorily answered. One idea that was popular in the past is that a nova is due to a collision between two stars. All the stars are moving at tremendous speed, and if two should happen to hit, something would happen. Such a collision might well produce a nova, but the fact is that the stars are so scattered in space that on the average a collision could not occur more often than once in a million years. This is the fatal objection to this theory, when we think of the five bright novae since 1900.

Probably it is caused by a sudden release of energy already within the star. According to modern ideas, the energy of the stars comes from an actual breaking up of their matter into light and heat. This process is continually taking place and if something should happen to increase it temporarily, it might produce a nova. But what that "something" is that might happen is not known. One suggestion, and a plausible one, is that a small body, a small meteor, for instance, might serve as a trigger to set off the explosion.

Perhaps a meteor might come in from outer space so accurately aimed, and travelling so fast, that it would hit the sun. It might be carried far into the star's interior before it met layers of strength enough to impede its progress. Then the energy that it had by virtue of its motion would be changed into heat and a lump of highly heated material would result. Perhaps it would be millions of degrees in temperature. At this high temperature, all sorts of things are likely to happen that do not occur at the temperature to which we are used. Some of the atoms themselves might be broken down very rapidly and a literal explosion would result. It would throw off some of the lighter layers of the star, but after it was over, the star might go on pretty much as before.

Of course, if this should happen to the sun, all of the planets would be quickly burned up. We earth dwellers would hardly have time to realize what had happened before we were burnt to cinders. Fortunately, there is no need to suppose that there is any immediate danger of this thing happening. However, there are perhaps a billion stars within reach of a large telescope. If there are ten times as many capable of becoming new stars, and as there are, on the average, ten nova a year, including the fainter ones, any star would be a nova on the average of once in a billion years. Long though this period may seem, it is short in the life of a star, and so most of the stars may have been novae several times in their history. We cannot tell whether or not the sun has ever been a nova, but the probabilities are that it will be many, many millions of years before it becomes one again, if ever.

This month brings six first magnitude stars to the evening skies. One of these is Deneb, which has already been mentioned. Directly west of Deneb, in the constellation of Lyra, the Lyre, is Vega. To the southwest of Cygnus is Aquila, the Eagle, with first magnitude Altair. Low in the northwest is Bootes, with the bright Arcturus, which will soon disappear from the evening sky completely until next year. In the south near the horizon is Fomalhaut, in Piscis Austrinus, the southern fish. Low in the northeast is Auriga, the charioteer, with the bright Capella. In a few months this star will be high over head in the evening skies.

Only one planet has been left in the evening sky, and that is Saturn. It is on the meridian, directly south at sunset, and sets about four and a half hours after the sun. Mars and Mercury are also in the evening skies this month, but so near the sun that they can hardly be seen. Venus and Jupiter are both brilliant morning stars, and can be seen before sunrise in the eastern sky.

Science News-Letter, September 7, 1929

Pennies in the Pool

Geology

A bushel and a half of hairpins, nails, badges and other miscellaneous articles too numerous to mention have been retrieved from Handkerchief Pool in Yellowstone National Park during a recent housecleaning.

According to Dr. E. T. Bodenburg, ranger naturalist, visitors at the Park must have the idea that the famous pool operates on the principle of a slot machine, for coins to the value of $1.98 were included in the haul.

The investigation of the spring's "plumbing" was undertaken to facilitate the current movements for which the spring is noted. The currents are due to the cool water sinking on the sides of the pool while the warm water rises in the center.

Science News-Letter, September 7, 1929

FIRST GLANCES AT NEW BOOKS

RELIGION IN AN AGE OF SCIENCE—Edwin A. Burtt—*Frederick A. Stokes Co.* ($1.50). A professor of philosophy in the University of Chicago calls for a radical reconstruction of religious forms and faith in accordance with modern science and freed from the inadequate conceptions of tradition. "The central theme as regards its bearing on religion is simply that it is more important to focus sympathetic and intelligent attention upon live, deep-seated present needs of men as they arise than to cling to any emotionally precious deposit of the past."

Philosophy
Science News-Letter, September 7, 1929

PERSONALITY AND THE SOCIAL GROUP—Ernest W. Burgess—*University of Chicago* ($3). The first appearance in book form of the papers delivered at the twenty-second annual meeting of the American Sociological Society. Personality is here discussed from a new angle; the interreaction between the group and the individual is the main theme.

Sociology—Psychology
Science News-Letter, September 7, 1929

THE BAHANGA—N. Stam—*Cath. Anthropol. Conf.* (60c.). An interesting brochure on the life and death, politics and religion, of a hitherto little known African tribe.

Ethnology
Science News-Letter, September 7, 1929

PERSONALITY ADJUSTMENTS OF SCHOOL CHILDREN—Caroline B. Zachry—*Scribners* ($1.80). A series of case studies which will aid the teacher or parent in solving mental hygiene problems. A novel feature of the work is a chapter on the quiet, overconscientious child. The author points out that the "good" child, seldom thought of as presenting any problem, may need attention as much as her troublesome playmates.

Education—Psychology
Science News-Letter, September 7, 1929

SOCIAL GEOGRAPHY SERIES—Frederick K. Branom and Helen M. Ganey—*Sadlier* ($1.76). A school text book presenting geography from a social aspect.

Geography
Science News-Letter, September 7, 1929

DAVID GOES TO GREENLAND—David Binney Putnam—*Putnam* ($1.75). The school edition of an adventure book by a boy for boys.

Geography
Science News-Letter, September 7, 1929

CHEMICAL WARFARE—ITS POSSIBILITIES AND PROBABILITIES—Elvira K. Fradkin—*Carnegie Endowment for International Peace* (5c.). This careful study of the latest mode of warfare comes to the conclusion that wholesale destruction of lives and terrorization of civilian population will occur if chemical warfare is used in the future. At the same time it concludes that international agreements, while they may have some effect, should not lull the people into a feeling of security against the ever-threatening horror of chemical warfare. Ultimate security lies with the awakened, intelligent, watchful attitude of the peoples of the world and peaceful settlement of dispute in the opinion of this survey.

Chemistry—War
Science News-Letter, September 7, 1929

NORTH AMERICAN ORCHARDS—W. H. Chandler—*Lea and Febiger* ($4.50). This is a compact but thorough-going book, giving essential information about the cultivation and care of orchard trees all the way from familiar apples and cherries to exotic loquats and jujubes. Orchard ecology, tree diseases, insect pests, packing, shipping, pruning, fertilizing, all receive due attention; and the text is enlivened with occasional clean-cut and pertinent half-tone illustrations.

Horticulture
Science News-Letter, September 7, 1929

A POPULAR GUIDE TO THE STUDY OF INSECTS—E. Porter Felt—*N. Y. State Museum, Albany* (50c.). This compact small book gives the beginning entomologist helpful hints on where to hunt for his prey and what to do when he catches it. Each of its brief chapters concludes with several references to the most useful literature on its particular subject.

Entomology
Science News-Letter, September 7, 1929

CHECK-LIST OF THE FRESH-WATER FISHES OF OREGON AND WASHINGTON—Leonard P. Schultz—*U. of Washington Press* (25c.). Of interest to systematic ichthyologists.

Ichthyology
Science News-Letter, September 7, 1929

CHILDREN, MEET THE BIRDS—Mary Kendall Hyde—*Stratford* ($2). Nature lore for children, put into conversational-narrative form. There is an unescapable "written-down" flavor about this book.

Nature Study
Science News-Letter, September 7, 1929

BIBLIOGRAPHY OF AMERICAN NATURAL HISTORY: PIONEER CENTURY, 1769-1865. Vol. III—Max Meisel—*Premier Publ. Co.* ($7.50). With this volume, a monumental work of incalculable value to students of botany, zoology and allied sciences in America is brought to completion. Not only are the original works of classic authors like Linnaeus, Kalm, Muhlenberg, Agassiz and Gray properly cited, but many forgotten writers of early days, whose works may give decisive turns in the settlement of troublesome historical and scientific questions, are drawn from their dusty obscurity and made available to modern scholarship. Author and publisher alike are to be congratulated on the successful conclusion of their work.

History of Science
Science News-Letter, September 7, 1929

TREES AND FLOWERS OF YELLOWSTONE NATIONAL PARK—Frank Thone—*J. E. Haynes, St. Paul* (75c.). A new edition of a popular guide to the plants of Yellowstone National Park which has been in successful use for six years. About 120 species are briefly described, and each illustrated with a clear line drawing. There are also short chapters on the ecology of the Yellowstone vegetation.

Botany
Science News-Letter, September 7, 1929

BOTANICAL ESSAYS — Willard N. Clute—*W. N. Clute Co., Indianapolis* ($1.75). Chatty, informal, discursive chapters that inculcate the reader in the mysteries of plant ecology before he is aware.

Botany
Science News-Letter, September 7, 1929

FOREST TREES OF THE DISTRICT OF COLUMBIA—Wilbur R. Mattoon and Susan S. Alburtis—*Amer. Forestry Assn.* (30c.). Washington is at once a city and a forest. Carved out of an interesting wooded territory on the boundary between coastal plain and piedmont, it has had added to its native silva a considerable number of fine exotic species adapted to the coast states climate, so that the visitor finds himself walking or riding through a continuous arboretum even when he is "down town." For these reasons this handy, cleanly illustrated booklet should find acceptance by a large public.

Dendrology
Science News-Letter, September 7, 1929

First Glances at New Books—*Continued*

THE GREAT APES—Robert M. Yerkes and Ada W. Yerkes—*Yale University Press* ($10). A summary of the available scientific findings about the anthropoid apes. Years of patient toil stand back of this magnificent volume, which shows, sadly enough, however, that only a beginning has been made in the accumulation of actual knowledge of the primates' psychology and life history.

Zoology
Science News-Letter, September 7, 1929

COLLEGE TEXTBOOK OF BOTANY—David M. Mottier—*Blakiston* ($3.50). A well gotten up presentation of the standard beginning course in botany for college students.

Botany
Science News-Letter, September 7, 1929

CANADA AND THE UNITED STATES—Hugh L. Keenleyside — *Knopf* ($3.25). As a comprehensive history of two nations this will interest everyone whose interest calls them to cross the long and peaceful political line that separates Canada from the United States.

History
Science News-Letter, September 7, 1929

MAGNETISM AND ELECTRICITY—Morris Meister—*Scribners* ($1). This is the sort of a book that makes one of an older generation wish that he were again in school, so that he could study from it. Intended for elementary and junior high schools, it presents in a simple and lucid manner the essentials of electricity and magnetism. But what should make it an unalloyed joy to the pupil are the numerous experiments, showing how to make simple telegraph instruments, motors, lights and bells.

Electricity
Science News-Letter, September 7, 1929

THE WESTWARD MARCH OF AMERICAN SETTLEMENT—Hamlin Garland—*American Library Association* (35c.). A pleasant addition to the "Reading with a Purpose" series. This time the course of reading outlined consists of fascinating, western fiction.

Education
Science News-Letter, September 7, 1929

THE ELEMENTARY SCHOOL LIBRARY—William A. King—*Scribners* ($2). Probably intended as a handbook for the use of school librarians and principals, but containing a wealth of material which will interest anyone who wishes to make a wise selection of reading material for children.

Library Science
Science News-Letter, September 7, 1929

OUR FEDERAL LANDS—Robert Sterling Yard—*Scribners* ($5). The story of wastage and salvage in the vast birthright of the United States, told by one who has grown gray in one of the most trouble-filled and unique of occupations—that of lobbyist for the people. Mr. Yard's book will find a welcome in the libraries of friends of the national and state parks, forestry men both public and private, conservationists, sportsmen and all who are interested in keeping at least a little of the out-of-doors intact.

Conservation
Science News-Letter, September 7, 1929

THE NEW INDUSTRIAL REVOLUTION—Walter Meakin—*Brentano's* ($3). Rationalization, the economic and industrial method exemplified in the reorganization of the German industry since the war, is explained in this history of the new industrial revolution which will be of interest to Americans because of the extension of the same principles into the international sphere.

Economics
Science News-Letter, September 7, 1929

HOW THE WORLD RIDES—Florence C. Fox—*Scribners* (88c.). Modern children who are always interested in going somewhere will learn much from this juvenile story of transportation.

Transportation
Science News-Letter, September 7, 1929

PETROLEUM FACTS AND FIGURES—Division of Public Relations, American Petroleum Institute—*Lord Baltimore Press* ($2). In a world that is so largely petroleum-propelled there is need of authentic data on oils and gasoline. This is the second edition of a valuable reference book.

Petroleum Technology
Science News-Letter, September 7, 1929

METROPOLITAN MUSEUM STUDIES, Volume I, Part Two—*The Metropolitan Museum of Art* ($4). From that great shrine of art, The Metropolitan Museum, there flow semi-annually in this publication reports on accessions and historical researches. A description of the town house in ancient Egypt is one interesting article.

Art—Achæology
Science News-Letter, September 7, 1929

THE SECRETARY'S HANDBOOK—Sarah Augusta Taintor, Kate M. Monro—*Macmillan* ($3.50). Recommended to all secretaries; not only our own but also to the secretaries of those who write to us.

Composition
Science News-Letter, September 7, 1929

SALESMANSHIP—John Alford Stevenson—*American Library Association* (35c.). This is number fifty-two of the "Reading With A Purpose" series and recommends the six following books for reading in this field: Influencing Men in Business, Walter Dill Scott and Delton T. Howard; The Mind of the Buyer, Harry Dexter Kitson; The Selling Process, Norval A. Hawkins; Constructive Salesmanship, John Alford Stevenson; The Psychology of Selling and Advertising, Edward K. Strong, Jr.; How to Sell at Retail, Werrett Wallace Charters.

Commerce
Science News-Letter, September 7, 1929

FOOD FOR CHILDREN AND HOW TO COOK IT—Marion W. Flexner and Isabella McL. McMeekin—*Holt* ($1.50). A useful mother's aid in that universal problem, getting the modern child to eat what is good for him.

Dietetics
Science News-Letter, September 7, 1929

REPORT OF AIRWAY MARKING COMMITTEE—Aeronautics Branch, Department of Commerce—*Government Printing Office* (Free). With every hamlet and metropolis becoming air conscious the rules for signs to guide aviators, detailed in this report, will be of general interest.

Aviation
Science News-Letter, September 7, 1929

INTERNATIONAL ASPECTS OF ELECTRICAL COMMUNICATIONS IN THE PACIFIC AREA—Leslie Bennett Tribolet—*The Johns Hopkins Press* ($2.50). With unrest in the Pacific area this detailed analysis of radio and cable problems in Asia, Australia and the two Americas bordering the Pacific, is a timely publication.

Communication
Science News-Letter, September 7, 1929

MAN'S SOCIAL DESTINY IN THE LIGHT OF SCIENCE—Charles A. Ellwood—*Cokesbury* ($2). A printing of the 1929 Cole Lectures before the Vanderbilt University School of Religion in which the lecturer looks into the future of mankind, his science, government, education, and religion.

Philosophy
Science News-Letter, September 7, 1929

YOUTH IN A WORLD OF MEN—Marietta Johnson—*Day* ($2.50). One woman's view of what is right and wrong with the rising generation. As an exponent of what she calls organic education she discusses play, thinking, discipline, morals, religion, sex, and schools for youth.

Education
Science News-Letter, September 7, 1929

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